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Hereditary Cerebellar Ataxia with Report of a Case.—Dr. Hugh T. Patrick read a paper with this title. (See page 129.)

Dr. Lewellys F. Barker spoke of the functions of the cerebellum, referring to the development of knowledge on the subject and its present status. The views held by Haller, Rolando and Weir Mitchell (cerebellum as a center of muscular energy), by Flourens and Wagner (cerebellum as a center of coördinating voluntary movements), by Gall (cerebellum as center of sexual passion), and by Lussana (cerebellum as center for muscular sense), were successively mentioned. The careful studies and experiments of Luciani were taken up in some detail, and the opinions of the Italian investigator upon the sthenic, tonic and static action of the cerebellum reviewed; the researches of Ferrier, Schiff, Risien Russell and Thomas, were referred to. The weight of evidence at present is in favor of the view that the cerebellum is above all an organ upon the integrity of which the maintenance of normal equilibrium, under ordinary circumstances, depends.

An analysis of the cases in human beings in which the symptoms seen during life could, as a result of post-mortem examination, fairly be referred to atrophy of the cerebellum, shows that the cerebellar symptom-complex, as met with in man, corresponds very closely to that producible experimentally in animals.

The structure of the cerebellum was described at some length, the description being couched in terms of the neurone conception. The central neurones of the cerebellum, as well as the cerebellopetal and cerebellofugal conduction paths were discussed. The speaker expressed the opinion that a large part of the confusion existing among clinicians with regard to the nomenclature of nervous diseases depends upon the effort which is so often made to classify diseases according as the lesions accompanying them are distributed chiefly in one or another of the coarser macroscopic subdivisions of the central cerebro-spinal nervous system. The time was past, he thought, when we could satisfactorily use the terms "Diseases of the Spinal Cord," "Diseases of the Cerebellum," etc., as headings under which to group the special diseases. A much more rational classification is that based upon the conduction paths and sets of neurone-systems involved in the pathological process. Thus diseases in which the *systema neuronicum spino-cerebellare dorsolaterale* is degenerated affect the cerebellum as well as the spinal cord. The macroscopic subdivisions of the central system are so intimately connected with one another by means of neurone-chains and neurone-complexes that a separation of the diseases of one from diseases of another is as a rule futile. When one considers the large number of neurone-systems connecting the cerebellum with the spinal cord and rhombencephalon on the one hand and with the cerebrum on the other, the number of possible permutations and combinations as regards lesions is seen to be very great. Why should not the clinical picture presented in different cases of diseases affecting the cerebellar neurones be extremely variable? The wonder is not that we have different types of disease which are somewhat closely allied to one another; it is much more that the clinical pictures presented in the various cases are so much alike as clinicians assert that they are. Possibly, when our methods of clinical differentiation have become more refined, we shall be able to speak more confidently than we can at present with regard to the exact neurone-systems involved in a given case, or series of cases.

Dr. Sanger Brown agreed with Dr. Patrick in asserting that Marie was not warranted in making the statements that he did; still in taking a broader view of the subject, and in accordance with the theory advanced by Dr. Barker, it was not a bad designation to refer to this disease as hereditary cerebellar ataxia. Marie was perhaps warranted in saying that in this disease the functions of the cerebellum were conspicuously involved. Whether the incoördination means an involvement of the cerebellum, Dr. Brown did not know definitely, but that was the popular idea entertained by the profession. He thought there was a marked difference clinically between the series of cases that he reported and the series first reported by Friedreich, particularly as to the onset and progress of the disease, and that it was well to make a clinical distinction. There might be a variety of types of the disease in certain families—that is to say, certain parts of the central nervous system would show at a certain age defects, and he did not think the time had come when it was safe to classify these lesions under very hard and fast lines.

Referring to the remarks of Dr. Barker, it was well established that the functions of the cerebellum, judging from experiments upon animals, could be vicariously performed fairly well. If certain neurones connected with the cerebellum undergo injury or degeneration, if the disease were limited to particular neurones, or if the cerebellum were mainly at fault, the patients would not become progressively more and more ataxic. In the series of cases reported by the speaker, the patients became progressively more and more ataxic. They became somewhat weak, but if they could use other parts of the nervous system, they certainly had years to get over that particular defect, but they became steadily worse.

Regarding the case of Dr. Patrick, Dr. Brown agreed with Dr. Patrick in many respects, although he was impressed with what James Collier and someone else stated in *Brain* some three or four years ago, in an elaborate report on diplegia, in which was reported a case similar to the one detailed by Dr. Patrick, only the cerebellum did not seem to be attacked so markedly in their case. He thought that case could be classified with other cases, if it were assumed that the functions of the cerebellum were more markedly disordered, or that the degeneration extended to the cortex of the cerebellum as well as the cerebrum.

Dr. Sydney Kuh pointed out some slight discrepancies which exist between the results of experimental work as to the functions of the cerebellum and clinical experience. The result of experiments would seem to show that the tendon reflexes are exaggerated after injuries to the cerebellum. It was known from clinical experience that there is no localization of a lesion within the cranial cavity which is so frequently associated with loss of the deep reflexes as a cerebellar lesion.

As to the influence of the vermis, when Dr. Kuh studied medicine he was taught that any part of the cerebellum might be destroyed without the manifestation of any symptoms, with the exception of the vermis. He had had occasion to examine the cerebellum of a patient who had been under the observation of Professor Vierordt and his assistant for physical diagnosis. The patient was an old man, who came complaining of violent pain, and upon examination they found a tumor of the liver. The patient's age and appearance justified a diagnosis of carcinoma of the liver and he was under observation and treatment for a long time. Dr. Kuh was perfectly safe in stating that no such symptom as cerebellar ataxia or any gross nervous symptom could have been overlooked by these two gentlemen. The patient was treated with hypodermics of morphine. The case seemed absolutely hopeless, and nothing but symptomatic treatment was possible, and after one or two doses of morphine the patient became comatose, and died.

Post-mortem examination revealed, instead of carcinoma of the liver, secondary to a supposed carcinoma of the stomach, a large angio-sarcoma of the liver. On opening the cranial cavity an angiosarcoma of the cerebellum was found. The tumor had destroyed practically every part of the superior vermis, the layer covering the tumor being hardly any thicker than an ordinary card. It did not seem to the speaker that very much of the function of that portion of the nervous system was preserved. It is true, the tumor, as it appeared at the necropsy was undoubtedly larger than it had been a short time before the patient's death, because death was largely due to hemorrhage into the tumor.

Dr. Kuh was particularly pleased to hear what Dr. Barker had to say regarding the present classification of nervous diseases. Even if we knew nothing about the neurones, or the anatomy of the nervous system, clinical experience alone should have taught members of the profession long ago that there is no such thing as peripheral, spinal or cerebral disease; and in spite of the anatomical researches extending back to the time when physicians hardly dreamed of a neurone that showed involvement of the nervous system in certain diseases, they are still classified in the same way.

Dr. Daniel R. Brower said it was impossible to make fine distinctions between several forms of hereditary cerebellar ataxia. However, this was still being done by some neurologists. He reported at his clinic at the County Hospital a year ago a case that manifested certain symptoms suggestive of hereditary cerebellar ataxia, for the reason that the cerebellar connections were in some manner interfered with. It was not an ordinary case, inasmuch as the reflexes were so exaggerated, the eye symptoms pronounced, and the gait more like the gait attributed to cerebellar disease; therefore, he called the case one of cerebellar ataxia.

Dr. Elbert Wing agreed with Dr. Barker in regard to the nomenclature of diseases. Physicians had been too exact in giving names to diseases, and in describing exactly the different pathological locations. A classification such as Dr. Barker had alluded to was necessary in clinical work. The old classification would be gradually abandoned, as more definite knowledge was obtained.

Dr. Hugh T. Patrick said, in referring to the remarks of Dr. Barker, that five or six years ago in writing an extended review of a monograph on hereditary cerebellar ataxia, he tried to express the same views that were presented by Dr. Barker, but did not do it so well, in that he tried to say, in all probability, the various diseases, including Friedreich's ataxia, were caused by progressive degenerative changes in nerve structures which were associated in function, and that the inception of the disease would vary in accordance with the particular set of neurones first involved. The clinical picture varied in accordance with the direction in which the disease progressed, and its extent. This was the conception which is taken now of a variety of cases, including those in which the mental deterioration is considerable.

Dr. Barker stated, in connection with the progression of the symptoms in the cases suggested by Dr. Brown, beginning in youth, that the cerebellar disease ought to be compensated for largely by the vicarious activity of other parts. It must be assumed that disease is not stationary, and that, in all probability, group after group of neurones become involved, and those standing nearest in function and relation are most likely to assume vicarious function. He agreed with Dr. Wing in regard to attempting to localize or ascribe things exactly to one organ. On the other hand, he believed we shall not be far wrong in attempting to localize diseases more exactly than we have heretofore by systems of neurones and conduction-paths. An effort should be made in every case to correlate the clinical symptoms with changes in the neurone-systems. If it is said that such and such neurone-systems are involved, and such others are intact, then make careful autopsies and study the pathology from the same standpoint; data would then be accumulated which could not be obtained by present methods.